

Express Mail No.: **EL656358064US**Date: **December 14, 2000**

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ANTONELLA FUSILLO

(Name of person mailing paper or fee)

(Signature)

09/719759
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

Attorney's Docket No:

LIPPERT

INTERNATIONAL APPLICATION NO.

PCT/EP98/08367

INTERNATIONAL FILING DATE

21 December 1998

PRIORITY DATE CLAIMED

23 June 1998

TITLE OF INVENTION

MULTIPLE-ROW RADIAL BEARING

APPLICANT(S) FOR DO/EO/US

ROLAND LIPPERT & CHRISTOPH BECKER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ Original or facsimile of an oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: Form PCT/IB/308

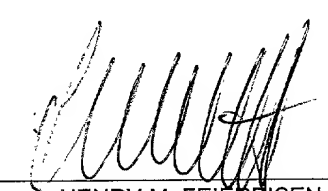
U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NO.	
09/719759		PCT/EP98/08367	LIPPERT	
17. <input checked="" type="checkbox"/> The following fees are submitted : BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):			\$860.00	
<input checked="" type="checkbox"/> For filing with EPO or JPO search report (37 C.F.R. 1.492(a)(5))				\$ 860.00
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(1))				\$ 690.00
<input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(2)) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2))				\$ 710.00
<input type="checkbox"/> Neither international preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(3)) nor international search fee paid to USPTO (37 C.F.R. 1.445(a)(2))				\$1,000.00
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(4)) and all claims satisfied provisions of PCT Articles 33(2)-33(4)				\$ 100.00
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				
Claims	Number Field	Rate		
Total Claims	8-20	x \$ 18.00		
Independent Claims	1-3	x \$ 80.00		
Multiple dependent claims (if applicable)		x \$270.00		
TOTAL OF ABOVE CALCULATIONS			\$860.00	
<input type="checkbox"/> Applicant claims small entity status pursuant to 37 C.F.R. 1.27. Reduction by 1/2 for filing by small entity.				
SUBTOTAL			\$860.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date 37 CFR 1.492(f).				
TOTAL NATIONAL FEE			\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +			\$ 40.00	
TOTAL FEES ENCLOSED			\$900.00	
Amount to be refunded				
charged				

- a. ☒ A check in the amount of **\$900.00** to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. **06-0502** in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **06-0502**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

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 Registration No. 31,084

2/PRTS

09/719759
JCO1 Rec'd PCT/PTO 14 DEC 2000

MULTIPLE-ROW RADIAL BEARING

FIELD OF APPLICATION OF THE INVENTION

[0001] The invention relates to a multiple-row radial bearing with at least one bearing race and pertaining rolling bodies, with the bearing race having at least one central collar.

BACKGROUND OF THE INVENTION

[0002] A bearing of this type in the form of a double-row cylindrical roller bearing is illustrated in the Technical Book by M. Albert/H. Köttritsch "Wälzlager" [*Rolling-Contact Bearing*], Springer-Verlag, Vienna New York 1987, Page 28. This cylindrical roller bearing includes a single-piece outer race which is provided with a central collar. The pertaining inner race is composed of two partial rings provided with collars on the right side and left side and held together by a retaining element.

[0003] A drawback hereby is that, on the one hand, grinding of the raceway of the outer race is more difficult as a result of the central collar, and, on the other hand, both inner bearing rings must be held together by a retaining element. This retaining element has to be fabricated separately and complicates

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collars, whereby the central collar of the outer race is formed by the ring and the inner bearing race is designed in one piece.

[0008] The advantage of this variation is the single-piece configuration of the inner bearing race. The need for additional fabrication of the retaining element, required by the prior art heretofore, for both partial bearing races is thus eliminated.

[0009] In accordance with claim 3, the slotted ring includes a circumferential outer rib, which is arranged in the groove, and two opposite axial ends, which expand in their radial extension, with the rib being arranged centrally or off-center with respect to the width of the ring.

[0010] On the one hand, this ring of inverted T-shaped configuration can be produced in a relatively simple manner as a consequence of the simple cross sectional profile, and, on the other hand, the inverted T-shaped configuration realizes an engagement of the rolling bodies from both sides, i.e. the ring can absorb axial forces in both directions. The axial securement of the ring itself is implemented by the circumferential outer rib which snaps, during assembly, in a groove provided in the raceway. The assembly of the ring may be realized either through threading, i.e. through an axial shift of the ring ends to one another, or through compressing by pushing one ring end below the other ring end. In this manner, a very narrow separating gap is realized, without adversely affecting the

engagement of the rolling bodies. The expansion in radial direction of the confronting ends ensures that the engagement area for the end faces of the rolling bodies is as great as possible. But even a wider separating gap is of no consequence because, in this case, the engagement of the rolling bodies is assumed by pertaining collars of the other bearing race.

[0011] Claim 4 sets forth that the slot extends parallel or at a certain angle to a bearing axis, i.e. is slotted straight. Of course, all other slot arrangements are conceivable.

[0012] According to a further feature of the invention, as set forth in claim 5, the outer collars of the inner race should be provided with a sealing element.

[0013] These sealing elements provide in a manner known that the space receiving the rolling bodies is sealed against ingress of dirt and against loss of lubricant. This can be suitably implemented, for example, by configuring the sealing element as a dragging seal which is held with one end in a groove in the outer collars of the inner race and has an opposite sealing lip which is biased against the outer race. Of course, it is also possible to use a sheet metal disk as sealing element which is secured to one of the bearing races and forms a sealing gap with the other bearing race.

[0014] According to another additional feature of the invention, as set forth in claim 6, the inner race should be provided with a circumferential lubricating groove and with one or more radial lubricating bores. In this manner, it is ensured that the bearing can be easily supplied with lubricant from inside.

[0015] Claim 7 sets forth that the ring is subjected to a heat treatment for increasing the hardness.

[0016] Finally, as set forth in claim 8, the ring should be coated with a friction-reducing material, for example polytetrafluoroethylene (PTFE). PTFE is in particular suitable because of all firm plastics it has the lowest coefficient of friction.

[0017] The invention will be described in more detail with reference to the following exemplified embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] It is shown in:

[0019] FIG. 1 a partial longitudinal section through a cylindrical roller bearing according to the invention;

[0020] FIG. 2 a side view of a slotted angle ring; and

[0021] FIG. 3 a longitudinal section through an enlarged angle ring according to FIG. 2.

DETAILED DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 shows a section of one half of a double-row radial cylindrical roller bearing which includes an outer bearing race 1 and a pertaining inner bearing ring 2 between which are disposed two sets of cylindrical rollers 3 rolling on non-labeled raceways. The inner bearing race 2 is provided with a central collar 4 and two outer collars 5 upon which the cylindrical rollers 3 bear with their end faces. The outer collars 5 of the inner race 2 are each provided with a groove 6 for receiving a sealing element 7 which rests with its sealing lip against the confronting running surface of the outer bearing race 1. Furthermore, the inner bearing race 2 has a circumferential lubricating groove 8 from which at one location a lubricating bore branches off in radial direction to terminate in a space between both cylindrical roller sets 3.

[0023] The outer bearing race 1 has a smooth running surface and is provided centrally with a circumferential groove 10 for receiving a ring 11. As shown in FIG. 2, this ring 11 is provided at a circumferential location with a slot 12 so that its circumference becomes variable. This ring 11 is of inverted

T-shaped configuration, i.e. it has a radial circumferential outer rib 13 which is guided in the groove 10 of the outer bearing race 1. Both confronting ends 14 of the ring 11 are supported by the raceway of the outer race 1 and their extension expands outwards in axial direction, so that the contact surface for the end faces of the cylindrical rollers 3 is enlarged.

[0024] Assembly of such a bearing according to the invention is implemented by pushing the outer bearing race 1 axially over the pre-assembled inner bearing race 2 with cylindrical roller sets 3 and slotted ring 11, until snapping into the groove 10. This means that the diameter of the slotted ring 11 initially decreases when the outer bearing race 1 is slipped over, until being able to expand again when the ring snaps in the groove 10.

REFERENCE CHARACTERS

- 1 outer bearing race
- 2 inner bearing race
- 3 cylindrical roller set
- 4 central collar
- 5 outer collar
- 6 groove
- 7 sealing element
- 8 lubricating groove
- 9 lubricating bore
- 10 groove
- 11 ring
- 12 slot
- 13 outer rib
- 14 end
- 15 bearing axis

Variable	Mean	SD	Min	Max	Skewness	Kurtosis	Normality
Age	38.5	12.5	25	65	0.5	3.0	0.95
Gender	1.2	0.4	1	2	0.1	1.5	0.98
Marital Status	1.5	0.5	1	3	0.2	1.8	0.97
Education	12.5	2.5	9	16	0.3	2.2	0.96
Income	1500	500	1000	2500	0.4	2.5	0.95
Occupation	1.8	0.6	1	3	0.1	1.6	0.98
Health Status	1.5	0.5	1	3	0.2	1.8	0.97
Stress Level	2.5	1.0	1	4	0.3	2.2	0.96
Life Satisfaction	3.5	1.5	1	5	0.4	2.5	0.95
Resilience	2.0	0.8	1	3	0.2	1.8	0.97
Optimism	3.0	1.0	1	4	0.3	2.2	0.96
Emotional Stability	2.5	0.8	1	3	0.2	1.8	0.97
Self-Esteem	3.0	1.0	1	4	0.3	2.2	0.96
Life Purpose	2.0	0.8	1	3	0.2	1.8	0.97
Meaning in Life	3.0	1.0	1	4	0.3	2.2	0.96
Existential Well-being	2.5	0.8	1	3	0.2	1.8	0.97
Overall Well-being	3.0	1.0	1	4	0.3	2.2	0.96

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5. Multiple-row radial bearing according to claim 2, characterized in that the outer collars (5) of the inner race (2) are provided with a sealing element (7).
6. Multiple-row radial bearing according to claim 2, characterized in that the inner race (2) is provided with a circumferential lubricating groove (8) and with one or more radial lubricating bores (9).
7. Multiple-row radial bearing according to claim 1, characterized in that the ring (11) is subjected to a hardening process.
8. Multiple-row radial bearing according to claim 1, characterized in that the ring (11) is coated with a friction-reducing material, for example polytetrafluoroethylene (PTFE).

ABSTRACT

A multiple-row radial bearing with at least one bearing race and pertaining rolling bodies, with the bearing race having at least one central collar, is characterized in that the central collar of the bearing race is formed by a single-piece ring (11), which is provided with a slot (12) and has variable diameter, for insertion in a circumferential groove (10).

FIG. 1

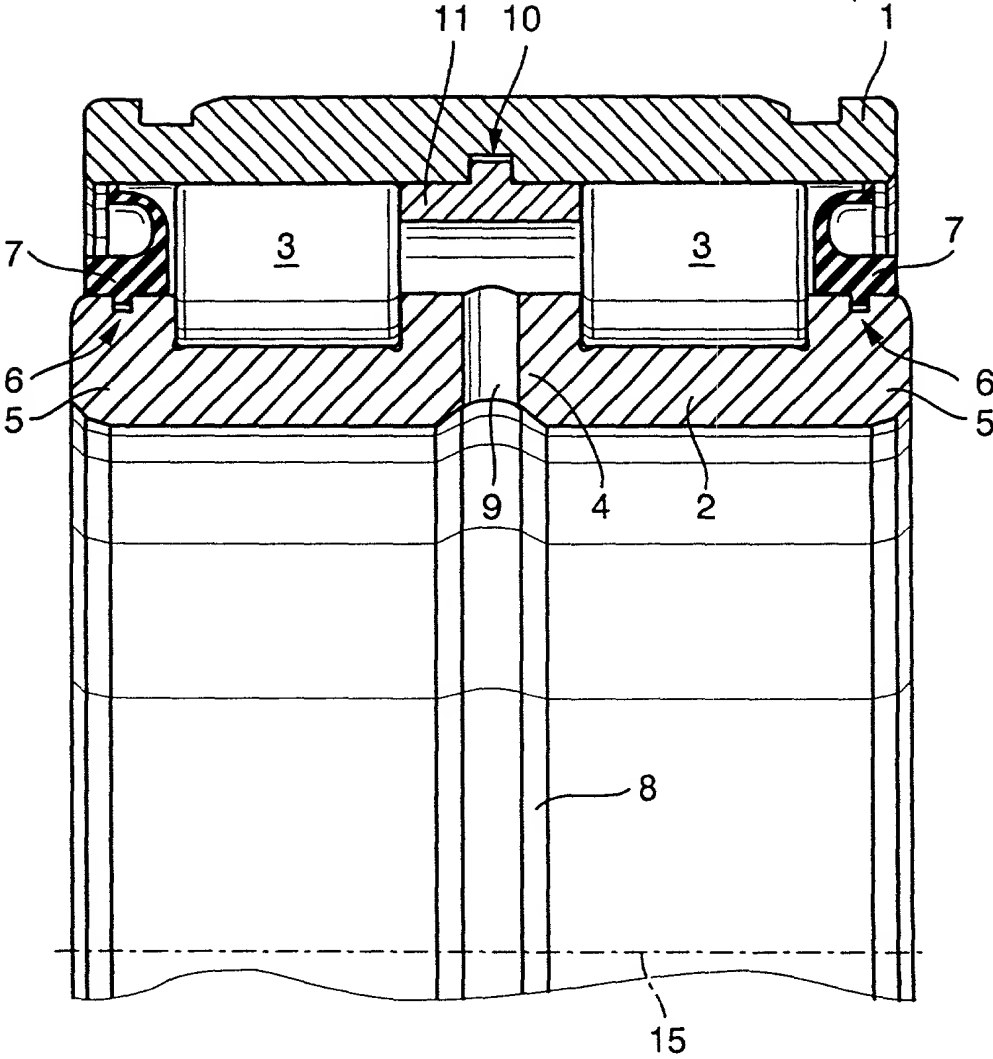


Fig. 1

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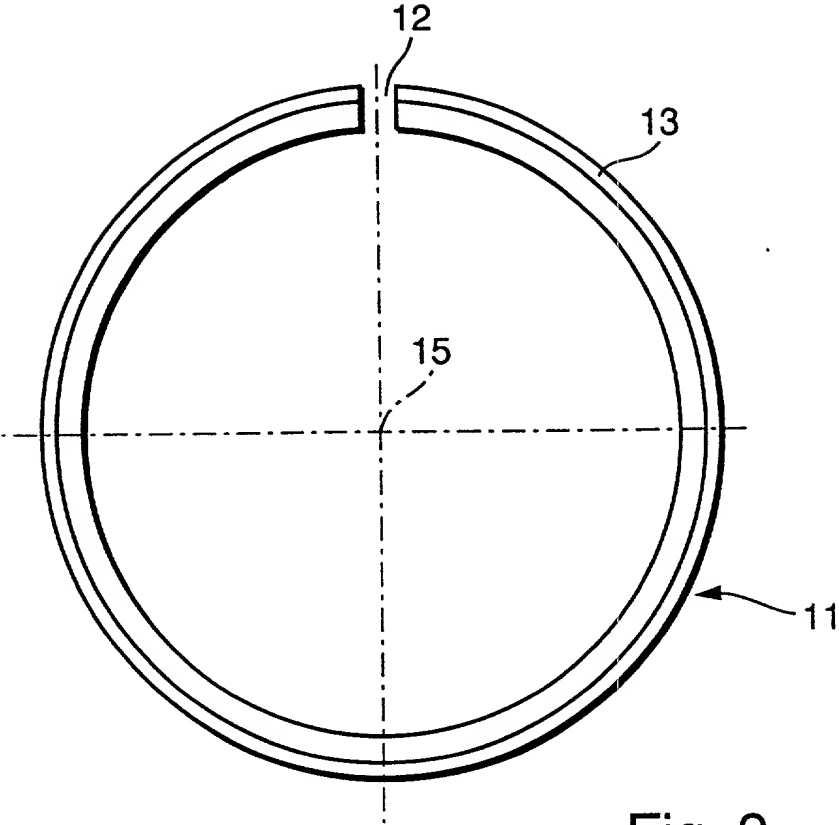


Fig. 2

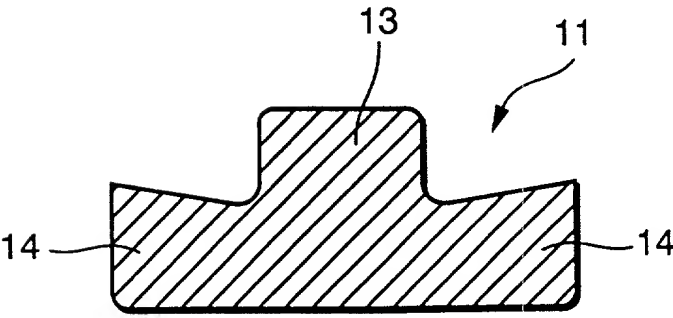


Fig. 3

Declaration and Power of Attorney for Patent Application

Erklärung für Patentanmeldungen mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

daß ich, nach bestem Wissen, der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

MEHRREIHIGES RADIALLAGER

deren Beschreibung
(zutreffendes ankreuzen)

- ☐ hier beigefügt ist.
☒ wurde angemeldet am 21 Dezember 1998
 unter der U.S.-Anmeldungs Nr. oder unter der
 Internationalen Anmeldenummer im Rahmen des
 Vertrags über die Zusammenarbeit auf dem
 Gebiet des Patentwesens (PCT)
PCT/EP98/08367 und am
 _____ abgeändert (falls
 zutreffend).

Ich bestätige hiermit, daß ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag, wie oben erwähnt, abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen an, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Titel 37, Code of Federal Regulations, §1.56 von Belang sind.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Titel 35, US-Code, §119(a)-(d), bzw. §365(b) aller unten angegebenen Auslandsanmeldungen für ein Patent oder Erfinderurkunden, oder §365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente oder Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MEHRREIHIGES RADIALLAGER

the specification of which
(check one)

- ☐ is attached hereto
☒ was filed on 21 December 1998
 as United States Application Number or PCT
 International Application Number
PCT/EP98/08367 and was amended on

 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

09719759-121400

Prior Foreign Applications
(Frühere ausländische Anmeldungen)

Priority Claimed?
Priorität beansprucht?

198 27 859.4 Germany
(Number) (Country)
(Nummer) (Land)

23/June/1998
(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country)
(Nummer) (Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

Ich beanspruche hiermit gemäss Titel 35, US-Code, §119(e), den Vorzug aller unten aufgeführten US-Hilfsanmeldungen

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) below

(Application No. / Anmeldendr.)

(Filing Date / Anmeldedatum)

(Application No. / Anmeldendr.)

(Filing Date / Anmeldedatum)

Ich beanspruche hiermit gemäss Titel 35, US-Code, §120, den Vorzug aller unten aufgeführten US-Patentanmeldungen bzw. §365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung, bzw. PCT internationalen Anmeldung in einer gemäß dem ersten Absatz von Titel 35, US-Code §112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, §1.56 von Belang sind und im Zeitraum zwischen dem Anmeldedatum der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldedatum bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or §365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

(Appl. No.)
(Anmeldendr.)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig
aufgegeben)

(Status)
(patented, pending
abandoned)

(Appl. No.)
(Anmeldendr.)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig
aufgegeben)

(Status)
(patented, pending
abandoned)

Ich erkläre hiermit, daß alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und daß ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, daß wissentlich und vorsätzlich falsche Angaben gemäss §. 1001, Titel 18 US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können, und daß derartig wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentbesitz gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem US-Patent- und Warenzeichenamt:

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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020151

PATENT 006111 MARK OFFICE

Voller Name des einzigen oder
ursprünglichen Erfinders

Full name of first inventor

1-00

ROLAND LIPPERT

Unterschrift des Erfinders

Datum

Inventor's Signature

Date

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Inventor's Signature

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